UNITED STATES DISTRICT COURT FOR THE DISTRICT OF MINNESOTA

WFC HOLDINGS CORPORATION,	)	
	)	
Plaintiff,	)	
	)	
v.	)	**Civil No. 07-CV-3320-JRT-FLN**
	)	
UNITED STATES OF AMERICA,	)	
	)	
Defendant,	)	

Revised Report of Walter Torous

1. Introduction

1.1. Qualifications

1. I am the Lee and Seymour Graff Distinguished Prof. of Finance at the University of California, Los Angeles Anderson School of Management. Previously, I was on the faculty at the University of Michigan and served as the Corporation of London Prof. of Finance at the London Business School. I graduated with a Bachelor of Mathematics degree from the University of Waterloo in 1976 and a Ph.D. in Economics from the University of Pennsylvania in 1981. My research deals with real estate finance, financial distress, derivatives and empirical methods in finance; it has appeared in numerous academic journals. I am currently a co-editor of *Real Estate Economics*, the official publication of the American Real Estate and Urban Economics Association. My paper "Commercial Office Space: Testing the Implications of Real Options Models with Competitive Interactions," which investigates the real options approach to valuing commercial real estate, was awarded Real Estate Economics' 2007 Edwin S. Mills best paper prize. I have spoken at numerous academic and business conferences about my research. I teach courses on Investments, Securitization, and Managerial Finance at the Master's level and Empirical Methods in Finance at the Doctoral level. More detailed information on my qualifications can be found in my curriculum vitae, which is attached as Exhibit 1.

2. Employees of Analysis Group, Inc., working under my direction, have assisted me in this assignment. I am being compensated at an hourly rate of $650 for time spent on this matter. No compensation is contingent upon the nature of my findings or on the outcome of this litigation.

1.2. Background and Assignment

3. Pursuant to an Exchange Agreement dated December 17, 1998, two Wells Fargo banks ("Wells Fargo") transferred their underwater lease interests in 21 properties to a non-bank subsidiary, Charter Holdings, Inc. ("Charter"). One of the transferred leases was a lease for #100 Garland Center (the "Garland building"), an office building in downtown Los Angeles.[1]

4. The master lease for the Garland building provides a series of six five-year lease extension options, the first of which can be exercised in 2009. The master lease also provides a purchase option that allows Wells Fargo to purchase the Garland building at its fair market value, as encumbered by the lease assuming the exercise of all extension options.

5. To provide an estimate of the potential value associated with both the purchase and extension options as of the beginning of 1999, Prof. Steven Grenadier was retained by counsel for Wells Fargo and submitted the "Revised Report of Steven R. Grenadier, Ph.D." on March 16, 2009.[2] I have been retained by the United States to analyze Prof. Grenadier's analysis and conclusions. In particular, I have been asked to investigate the valuation methodology employed by Prof. Grenadier and to estimate the potential value associated with the purchase and extension options.

1.3. Information Considered

6. Exhibit 2 lists the materials I considered for this report. My work on this matter is ongoing and I may review additional materials or conduct further analysis. I reserve the right to update or revise my opinion as necessary.

[1] The Garland building is a 12-story office building located in downtown Los Angeles' Central City West neighborhood, with approximately 725,000 rentable square feet. It has approximately 230,000 rentable square feet of data center space, a bank vault, and 350,000 square feet of office space, as well as a nine-story parking garage. See WFC-LA-007-0264 to WFC-LA-007-0293 (at p. WFC-LA-007-0268).

[2] Prof. Grenadier submitted his original report on December 1, 2008, as well as a prior revised report on February 4, 2009.

1.4. Summary of Opinions

7. Prof. Grenadier's estimates of the 1998 values of the Garland building's extension and purchase options are flawed and, consequently, overstated. His estimates reflect numerous errors in his assumptions regarding prospective rental income and the costs of exercising the options. Prof. Grenadier's analysis is particularly sensitive to the assumed volatility of prospective lease rates, and further, his analysis is based on a misread estimate of volatility of geographically dispersed office building values. I have revised Prof. Grenadier's analysis to correct for these errors. I use a lease rate volatility based on actual lease rates for office buildings in Los Angeles that are comparable to the Garland building. My analysis provides values of the Garland extension and purchase options of $2,844 to $386,233 and $2,460 to $342,921, respectively. These values amount to approximately two percent, or less, of the values Prof. Grenadier's analysis attributed to Garland's extension and purchase options.

2. Background on Options

2.1. Definition of an Option

8. A *call option* gives its owner the right, but not the obligation, to buy the underlying quantity at a fixed price, the *exercise price*, at any time before the option's expiration date.[3] A *put option* gives its owner the right to sell the underlying quantity at its exercise price through its expiration date.[4] Each option owned by a buyer is *written* by a seller, and if an option is exercised by its buyer, its writer is obligated to perform under the option contract.[5] The value of an option depends on the value of the underlying quantity to which it pertains. Since the right to exercise an option has value, the writer is compensated by a payment from the buyer.

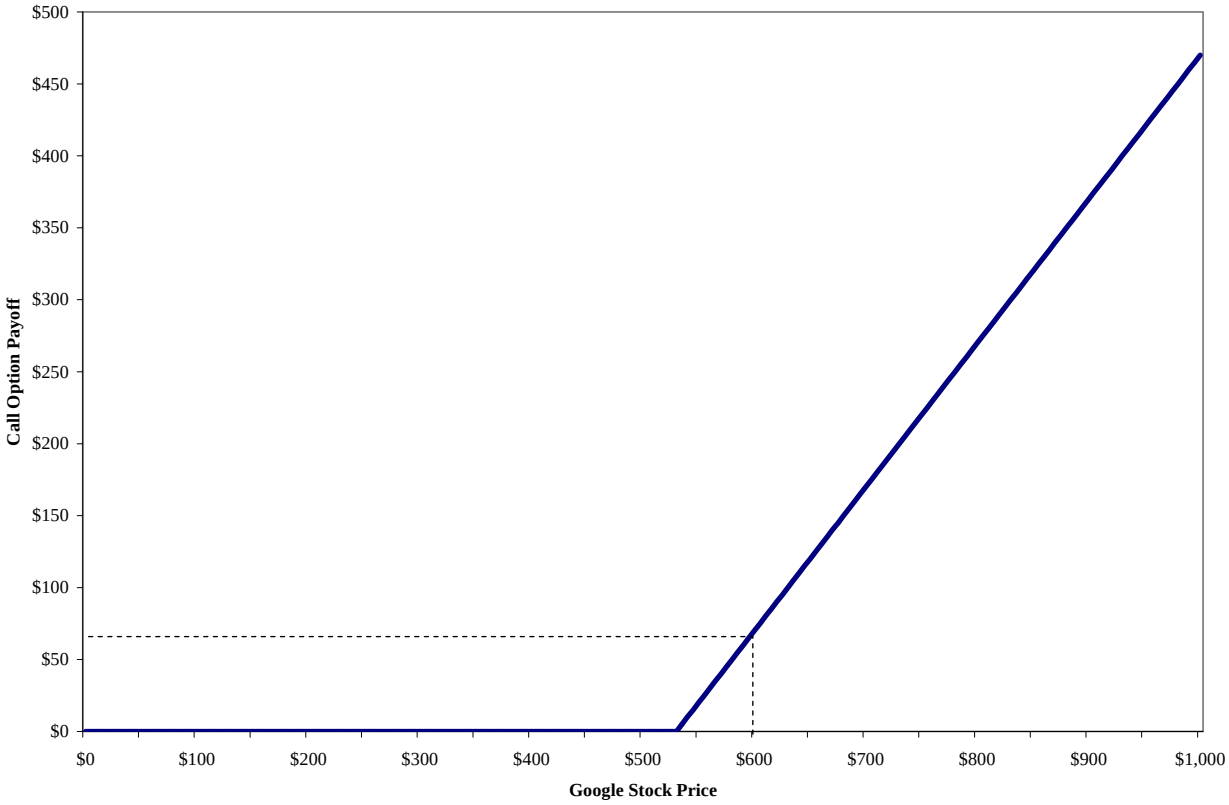
9. The most well known options are contracts on common stock which trade on organized exchanges. Consider a call option on Google common stock with an exercise price of $530 and expiring September 18, 2009.[6] One option gives its buyer the right to buy one share of Google common stock for $530 per share at any time through September 18, 2009 regardless of the then prevailing Google share price. To acquire this right on May 7, 2009, the buyer would have had to

[3] John C. Cox and Mark Rubinstein, Options Markets (Prentice-Hall 1985), p. 1.
[4] Ibid., p. 3.
[5] Ibid., pp. 1-2.
[6] Yahoo! accessed on May 7, 2009.

pay the writer of this call option $2.10.[7] On May 7, 2009, Google's share price was $396.61.[8] The option premium was low because the market thought it was unlikely that Google's stock price would exceed $530 by September 18, 2009.

10. Figure 1 summarizes the payoff to the buyer of the call option described above. The vertical axis measures the option's payoff per share as a function of possible prevailing Google share prices given on the horizontal axis. If the Google share price is less than $530 on the option expiration date, then the payoff to the call is zero. In this case, the right to buy Google at $530 per share is worthless. However, the right to buy Google at $530 per share is valuable if Google trades for more than $530 per share. In this case, the payoff increases by one dollar per share for every dollar increase in the share price beyond $530.

Figure 1: Payoff to Buyer of Google Call Option



[7] Ibid.
[8] Ibid.

11. Figure 1 makes it clear that the payoff to the option buyer depends on the price of underlying quantity on the option expiration date. In the example above, the more the price of Google's common stock exceeds the exercise price of $530, the greater the payoff to the call owner. For example, if the price of a share of Google stock is equal to $600 on the option expiration date, then the call buyer will receive a payoff of $70.[9] For this reason, a measure of uncertainty surrounding the underlying quantity strongly affects the value of the option.

12. The implications of option pricing theory extend well beyond exchange-traded options. Quite generally, the principles of option valuation can be applied to any security whose returns are contractually related to the returns of some other security. From this perspective, in many cases a firm's capital investment decision is analogous to a financial call option. Firms often have the right, but not the obligation, to buy an underlying real asset, such as an office building, at some future date at a contractually specified price. This so-called real options approach to capital investment recognizes the option value of waiting for more information and emphasizes the ongoing uncertainty of the economic environment in which firms operate.

2.2. Option Valuation

13. The value of an option, financial or real, can be determined by using a no arbitrage argument.[10] That is, given certain simplifying assumptions, a portfolio of the underlying quantity together with a riskless bond can be formulated which replicates an option's payoff for all possible future states of the world.[11] Two assets with identical payoffs must be priced equally; otherwise, the less expensive asset would be purchased and simultaneously the more expensive asset sold. This strategy would earn a profit today and entail no future obligations on the part of the investor. In other words, the investor can obtain something for nothing; he would have an arbitrage opportunity. In a well functioning financial market, arbitrage opportunities are not available. Imposing this absence of arbitrage opportunities determines the option's premium or,

[9] The option owner gets to buy a share of stock, which is worth $600, for $530, so his payoff from exercise is $600 - $530 = $70.
[10] Black, F. and M. Scholes, 1973, "The Pricing of Options and Corporate Liabilities," *The Journal of Political Economy*, Vol. 81 (3), pp. 637-654.
[11] John C. Cox and Mark Rubinstein, Options Markets (Prentice-Hall 1985), pp. 181-2.

in other words, the option's value.[12] Black and Scholes (1973) use this approach to value an option written on a non-dividend paying stock that can only be exercised on its expiration date.[13]

14. The difficulties in valuing a real option are practical. Real options are very often complex, making it difficult to specify all possible project payoffs.[14] Further, option valuation models, such as the Black-Scholes model, were originally formulated to value financial options and make assumptions that may not be appropriate in valuing real options.

15. For example, Black-Scholes assumes that a portfolio of traded investments can be constructed to replicate the payoffs of an option, and therefore permits the option to be valued based on standard no-arbitrage arguments.[15] This assumption relies on the requirement that assets are frequently traded; yet, many real assets are infrequently traded.[16] For example, while millions of Google shares trade on any given day, an office building rarely changes hands. Also, it may be difficult to accurately measure the uncertainty of the underlying project cash flows, which is an important input to real option analysis.[17] Thus, the real options approach has been found to be particularly applicable for natural resource investments, like the decision to open or close a gold mine, because there is an active market in the underlying natural resource, in this case, gold, which facilitates the measurement of the investment's uncertainty.[18] As a result of these potential problems, real option values obtained from Black-Scholes, while yielding qualitative insights into a firm's investment decisions, are less reliable than when valuing financial options.[19]

2.3. Importance of Volatility

16. A number of inputs are required in valuing an option with the Black-Scholes model. These include the current asset price, the option's exercise price, the time to expiration, the

[12] Black, F. and M. Scholes, 1973, "The Pricing of Options and Corporate Liabilities," *The Journal of Political Economy*, Vol. 81 (3), pp. 637-654.
[13] Ibid.
[14] Triantis, A. and A. Borison, 2001, "Real Options: State of the Practice," *Journal of Applied Corporate Finance*, Vol. 14 (2), pp. 8-24.
[15] Black, F. and M. Scholes, 1973, "The Pricing of Options and Corporate Liabilities," *The Journal of Political Economy*, Vol. 81(3), pp. 637-654 (at p. 641).
[16] Fortune, P., 1996, "Anomalies in Option Pricing: The Black-Scholes Model Revisited," *New England Economic Review*, pp. 17-40 (at p. 23).
[17] Triantis A. and A. Borison, 2001, "Real Options: State of the Practice," *Journal of Applied Corporate Finance*, Vol. 14 (2), pp. 8-24 (at p. 13).
[18] Borison, A., 2005, "Real Options Analysis: Where are the Emperor's Clothes?" *Journal of Applied Corporate Finance*, Vol. 17 (2), pp. 17-31 (at p. 23).
[19] Luehrman, T., 1998, "Investment Opportunities as Real Options: Getting Started on the Numbers," *Harvard Business Review*, pp. 3-15 (at p. 14).

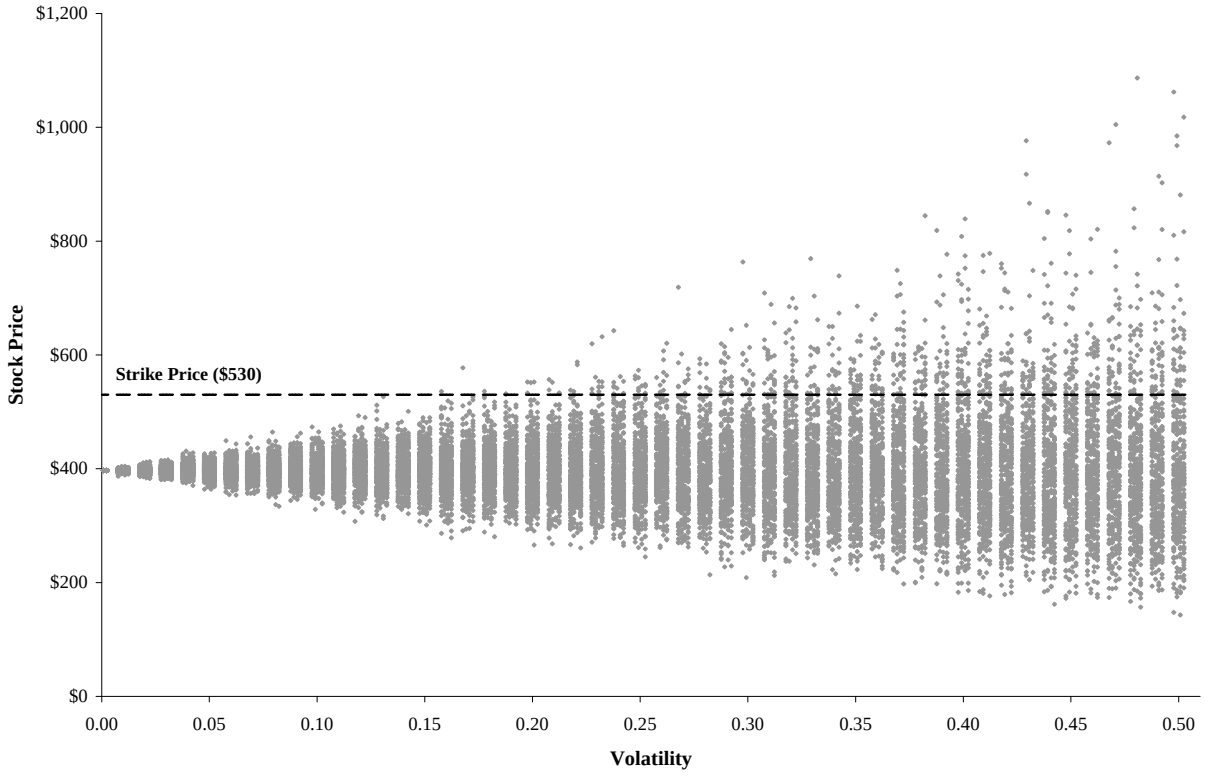
riskless rate of interest over the option's term to expiration, and a measure of the uncertainty of the underlying asset price on the option's expiration date, that is, the asset's volatility.[20] Of these inputs, the only unobservable input is the stock's volatility.

17. The sensitivity of the option value to changes in volatility can be illustrated by returning to the Google example. To show how the option value varies with volatility, I use the Monte Carlo method of option valuation, as did Prof. Grenadier in his report. This is an alternative approach which is consistent with the Black-Scholes approach to value an option written on a non-dividend paying stock.[21] Under this approach, the realized Google stock price is simulated numerous times to determine the call option's expected payoff on its expiration date, September 18, 2009. This expected future payoff is then discounted to the present at the prevailing risk-free rate of interest to arrive at the call option's current value.

18. Figure 2 illustrates how simulated realized prices are affected by Google stock volatility. At low volatilities, realized stock prices remain close to the initial Google stock price of $396.61 on May 7, 2009 while at higher volatilities, realized stock prices may be significantly greater or less than the initial Google stock price. This increased dispersion means that the call option is more frequently in the money, and further, that it is more likely to be deep in the money.[22] As such, the option is more valuable.

[20] John C. Cox and Mark Rubinstein, Options Markets (Prentice-Hall 1985), p. 255.
[21] Boyle, P., 1977, "Options: A Monte-Carlo Approach," *Journal of Financial Economics*, Vol. 4, pp. 323-338.
[22] A call option is in the money when the option's strike price is below the market price of the underlying asset. See John C. Cox and Mark Rubinstein, Options Markets (Prentice-Hall 1985), p. 4.

Figure 2: Realized Google Stock Price – 400 Simulations per Volatility Input[23]



19. When the realized Google stock price on the option expiration date is greater than the exercise price of $530 at expiration, the call option is considered to be in the money and has value, whereas when the Google stock price is less than $530, the option will not be exercised and will have no value. As the above figure shows, the likelihood of the option being in the money increases as the volatility of the stock increases; as such, the value of the option increases with volatility.

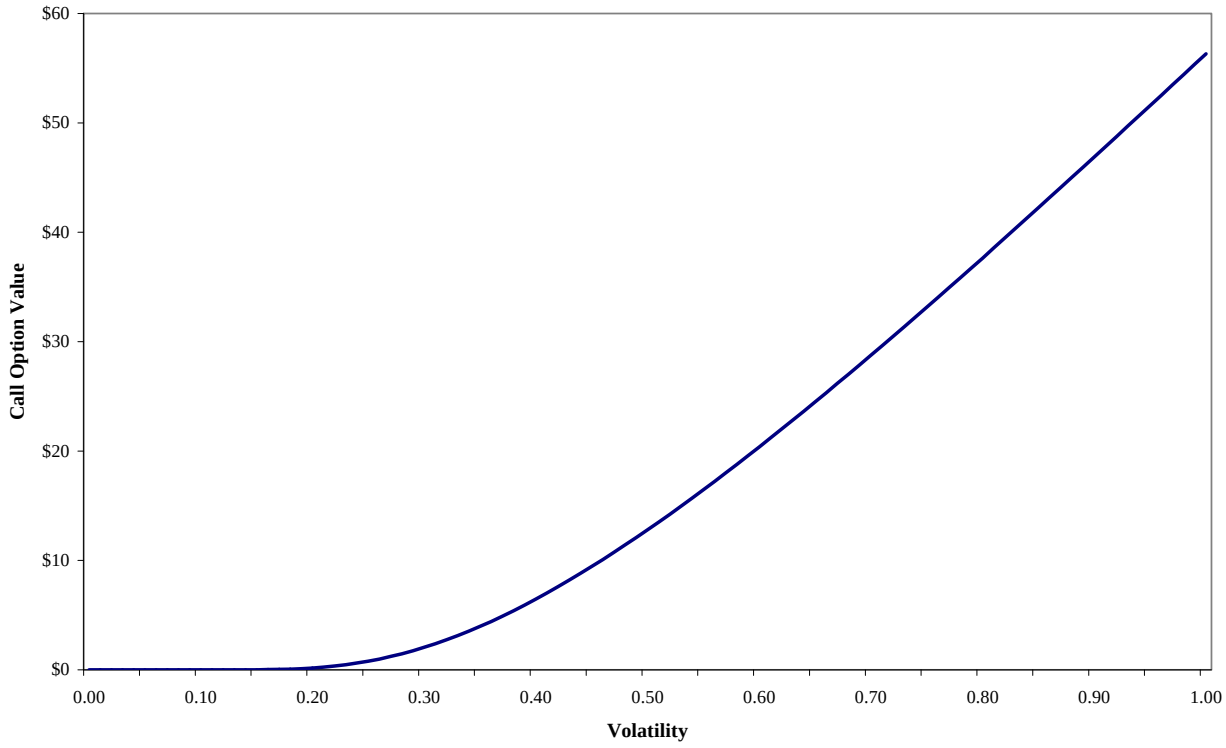
20. This conclusion is demonstrated below in Figure 3, which plots the Black-Scholes value of the Google call option for volatilities from zero to 100 percent.[24] For volatilities less than 15 percent, the option has little or no value, whereas for volatilities near 100 percent, the call option

[23] These simulations are based on a starting Google stock price of $396.61, a risk-free rate of interest equal to 0.32 percent, the prevailing 6-month constant maturity Treasury rate as of May 7, 2009, and a time to expiration of 0.37 years. Yahoo! accessed on May 7, 2009.

[24] These results are based on a starting Google stock price of $396.61, a risk-free rate of interest equal to 0.32 percent, a time to expiration of 0.37 years, and a strike price of $530. Yahoo! accessed on May 7, 2009.

has significant value. As such, for both the writers and buyers of this Google call option, it is important to obtain an accurate estimate of Google's stock price volatility.

Figure 3: Value of Google Call Option as Function of Volatility



21. There are two approaches available to estimate the volatility of the underlying quantity over the option's term to expiration. The first, which is based on the premise that past movements in the option's underlying quantity – in this case, Google's share price – are indicative of future movements, collects historical observations on changes in the underlying quantity and calculates the standard deviation of this series.[25] In the case of Google common stock, its *historical volatility*, based on the preceding month of daily closing stock prices, is 27 percent as of May 7, 2009.[26]

[25] John C. Cox and Mark Rubinstein, Options Markets (Prentice-Hall 1985), pp. 255-7.
[26] Based on Yahoo! accessed on May 7, 2009.

22. An alternative approach to measuring the volatility of an underlying quantity is to imply an estimate from market prices of an option written on it.[27] Since volatility is the only unobservable input into the Black-Scholes model, we can simply determine that value of Google volatility which makes the Black-Scholes value equal to the prevailing market price of the call option.[28] Since the example Google call option trades for $2.10, we can read off of the preceding figure that Google's implied volatility is 30 percent. That is, for a 30 percent volatility input, the Black-Scholes value corresponds to the market price of the call option on May 7, 2009. The advantage of implied volatility estimates is that they are based on market prices that reflect market participants' expectations of Google stock price movements over the future remaining life of the option.[29]

23. A disadvantage of implied volatility estimates is that they are based on a particular option pricing model. If this model is deficient and misprices options, the resulting volatility estimate will be inaccurate.[30] Also, option contracts may be thinly traded, rendering their prices stale and unreliable.[31] This, in turn, causes the calculated implied volatilities to be inaccurate. As a result of such problems in estimating implied volatilities, empirical studies have found that implied volatility estimates are often biased;[32] thus, implied volatility estimates should be interpreted with care.

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[27] John C. Cox and Mark Rubinstein, Options Markets (Prentice-Hall 1985), p. 278.
[28] Ibid.
[29] Poon, S. and C. Granger, 2003, "Forecasting Volatility in Financial Markets: A Review," *Journal of Economic Literature*, Vol. 41(2), pp. 478-539 (at p. 507).
[30] In particular, a number of assumptions must hold for option theory to produce a reliable implied volatility estimate. Examples of such assumptions include: (1) the price of the underlying quantity has a lognormal distribution or the logarithm of the price of the underlying quantity has a normal distribution, (2) there must be no arbitrage opportunities, and (3) trading of the underlying quantity must be continuous. Most empirical work also has assumed that there is no risk premium associated with volatility. To the extent that a risk premium exists, implied volatility estimates will be upwardly biased. See Doran, J. and E. Ronn, 2005, "The bias in Black-Scholes/Black implied volatility: An analysis of equity and energy markets," *Review of Derivatives Research*, Vol. 8, pp. 177-198 (at p. 195); Poon, S. and C. Granger, 2003, "Forecasting Volatility in Financial Markets: A Review," *Journal of Economic Literature*, Vol. 41(2), pp. 478-539 (at p. 507); Fortune, P., 1996, "Anomalies in Option Pricing: The Black-Scholes Model Revisited," New England Economic Review, pp. 17-40 (at p. 23).
[31] Mayhew, S. and C. Stivers, 2003, "Stock Return Dynamics, Option Volume, and the Information Content of Implied Volatility." *The Journal of Futures Markets*, Vol. 23 (7), pp. 615-646 (at p. 618).
[32] Doran, J. and E. Ronn, 2005, "The bias in Black-Scholes/Black implied volatility: An analysis of equity and energy markets," *Review of Derivatives Research*, Vol. 8, pp. 177-198; Hentschel, L., 2003, "Errors in Implied Volatility Estimation," *Journal of Financial and Quantitative Analysis*, Vol. 38 (4), pp. 779-810; Canina, L. and S. Figlewski, 1993, "The Informational Content of Implied Volatility," *The Review of Financial Studies*, Vol. 6 (3), pp. 659-681.

3. Description of Prof. Grenadier's Model

3.1. Background Information Regarding the Extension and Purchase Options Associated with the Garland Building Lease

24. A lease extension option is contingent on prevailing lease rates. It gives a tenant the right, but not the obligation, to extend the term of a lease at a fixed rate for a specified period of time. The tenant will choose to exercise the extension option only if it is in his economic interest to do so. This will depend on how prevailing lease rates in the market compare to the lease extension rate when the option is exercised. If the prevailing market lease rate exceeds the lease extension rate, the option will be exercised by the tenant. In the Garland building, a series of six five-year extension options are provided, with the first extension period beginning in 2009.[33] With a series of extension options, Wells Fargo may choose to exercise the initial extension option even if the market lease rate is below the extension lease rate because by exercising the initial option Wells Fargo retains the right to exercise subsequent extension options.

25. A purchase option gives the tenant the right, but not the obligation, to purchase a building at a specified price on a specified date. In the case of the Garland building, Wells Fargo can purchase the building at the beginning of 2009 for the building's "fair market value." The right to buy the Garland building at its prevailing market price has zero value. However, in the case of the Garland purchase option, the fair market value is encumbered by the building's lease assuming that all of the extension options are exercised.[34] Therefore, the Garland purchase option gives Wells Fargo the right, but not the obligation, to collect the difference between market lease payments and the fixed extension lease payments over the 30-year period between 2009 and 2038. The value of the purchase option in this case is equal to the value of a single 30-year lease extension option, as articulated by Prof. Grenadier.[35]

[33] Sublease agreement between RML Leasing Corp., as Lessor and First Interstate Bank of California, as Lessee, January 20, 1984. WFP-02232 to WFP-02345 (at p. WFP-02311).
[34] Sublease agreement between RML Leasing Corp., as Lessor and First Interstate Bank of California, as Lessee, January 20, 1984. WFP-02232 to WFP-02345 (at p. WFP-02270).
[35] Revised Expert Report of Steven R. Grenadier, March 16, 2009, pp. 9-10 ¶¶ 55 and 58

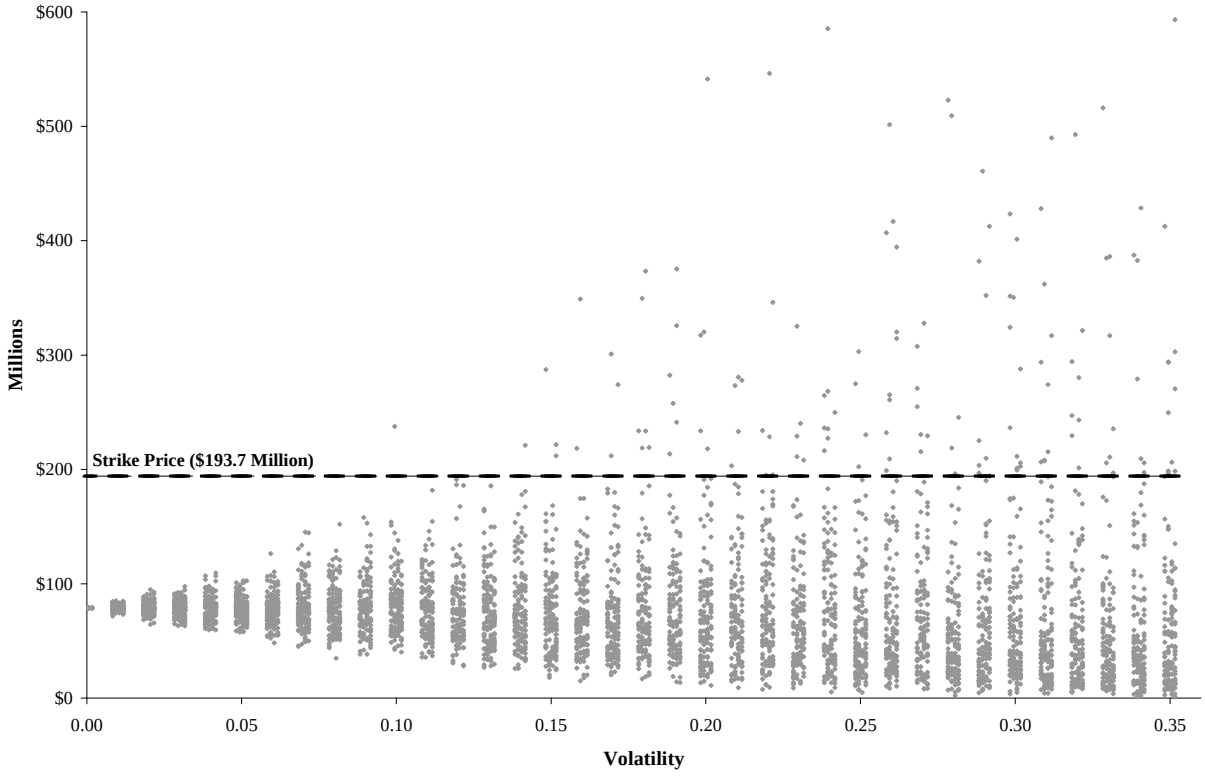
3.2. Prof. Grenadier's Approach in Valuing the Extension and Purchase Options

26. The Monte Carlo simulation method I discussed in the Google call option example is used by Prof. Grenadier to value the Garland extension and purchase options.[36] Future market rental rates are analogous to Google share prices because it is the uncertain value of future market rental rates which underlies the values of both the extension and purchase options. Therefore, to value the extension and purchase options using Monte Carlo simulation, realized lease rates are simulated numerous times to determine expected payoffs to these options. The expected future payoffs are then discounted to the present at the prevailing risk-free rate of interest to arrive at the options' current values. To simplify his analysis, Prof. Grenadier values the Garland extension option as three 10-year extension options as opposed to six five-year extension options.[37] The purchase option is valued as a single 30-year extension option.[38]

27. The uncertainty regarding future market office building lease rates is summarized by the volatility of market lease rates. Just as the value of the Google call option depends on the volatility of Google common stock, the values of the Garland lease extension and purchase options depend on the volatility of future market lease rates. This can be seen in Figure 4, which displays the results of simulating the present value of realized lease payments under the terms of the purchase option over the period 2009 to 2038 as a function of lease rate volatility. The assumed lease rate volatility ranges from zero to 35 percent. The purchase option is in the money when a realized present value exceeds the strike price. As the assumed lease rate volatility increases, the likelihood of the purchase option finishing in the money increases. In particular, the purchase option rarely finishes in the money at volatilities of less than 15 percent, and even at volatilities of more than 15 percent, the purchase option infrequently finishes in the money.

[36] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 7 ¶ 39.
[37] Ibid., p. 6 ¶ 32.
[38] Ibid., p. 10 ¶ 58.

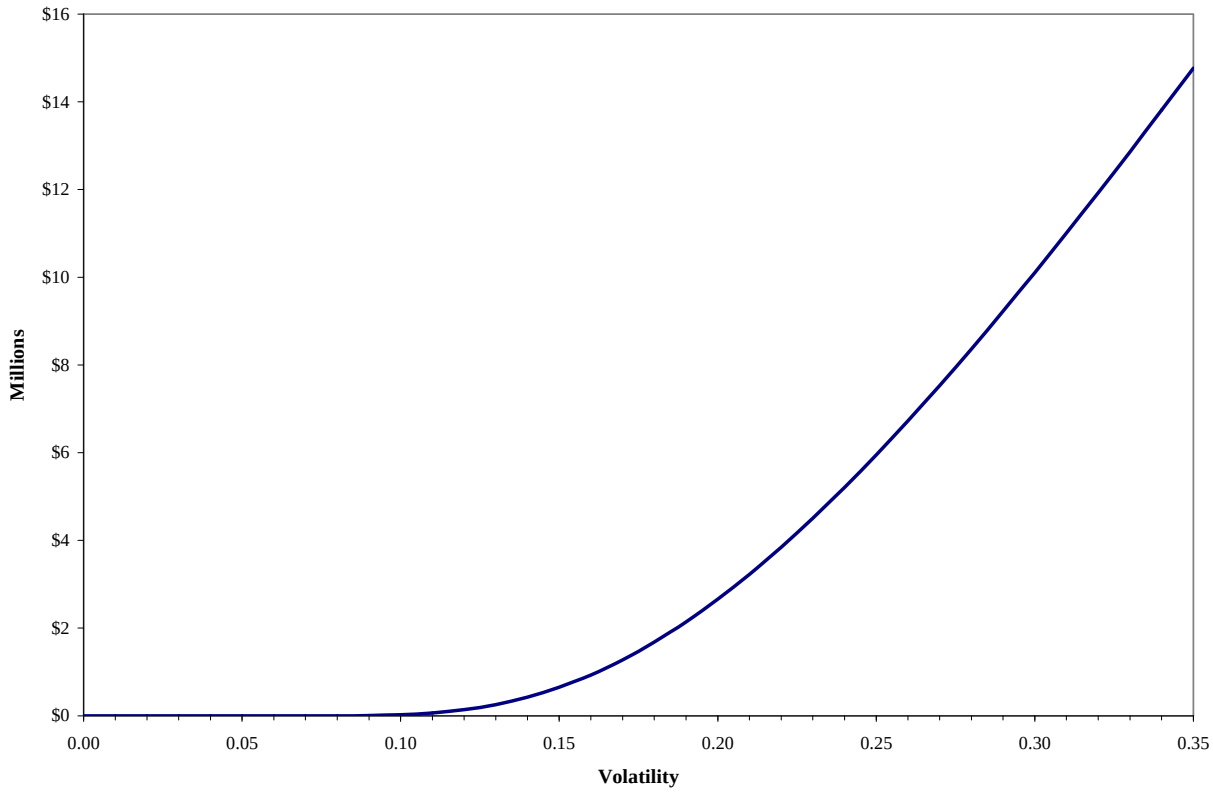
Figure 4: Realized Present Value of 2009 - 2038 Market Rents: 400 Simulations per Volatility Input[39]



28. I have replicated Prof. Grenadier's Monte Carlo methodology for valuing the Garland lease extension and purchase options. Figure 5 summarizes my estimated values of the purchase option as a function of the assumed volatility. As in the Google call example, the estimated value of the purchase option is extremely sensitive to the assumed volatility. When the assumed volatility is low, the estimated value of the purchase option as of 1999 is negligible. Only when volatility is high, as assumed by Prof. Grenadier, does the purchase option have significant value. This figure makes clear that the ability of Prof. Grenadier's methodology to accurately value the purchase and extension options will ultimately depend on the accuracy with which the underlying lease rate volatility is measured.

[39] These simulations are based on my corrections to Prof. Grenadier's inputs: S0, E1, E2, and E3. See Table 1 for the values of these inputs.

Figure 5: Estimated Value of Garland Purchase Option as of 1999[40]



4. Corrections to Prof. Grenadier's Implementation

4.1. Inputs and Assumptions

29. As described above, Prof. Grenadier values the extension and purchase options using a Monte Carlo simulation under a risk-neutral pricing approach.[41] Such modeling requires a number of inputs, including values for volatility, the risk-free rate of interest, the present value of net rental revenues from 1999 through 2008, and the present value of costs associated with exercising the purchase or extension options.[42]

30. In Table 1 and the discussion that follows, I review the assumptions that underlie the calculation of the present value of net rental revenues and the strike prices. With respect to these

[40] These simulations are based on my corrections to Prof. Grenadier's inputs: S0, E1, E2, and E3. See Table 1 below for the values of these inputs.
[41] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p.7 ¶ 39.
[42] Ibid., p.7 ¶¶ 36-41.

inputs, I identify a number of errors in Prof. Grenadier's calculations. In particular, errors are introduced as a result of internal inconsistencies within Prof. Grenadier's calculations, as well as through his reliance on conflicting source materials. Correcting these errors in Prof. Grenadier's analysis results in lower estimates of the values of extension and purchase options.

31. The present value of net rental revenues from 1999 through 2008, that is, the value of a 10-year lease, is denoted by S0 in Prof. Grenadier's modeling of the purchase and extension options.[43] In calculating S0, Prof. Grenadier relies on five assumptions: (1) the total available square feet in the Garland building is equal to 719,113, (2) the triple net rental rate is $6 in 1999, (3) the vacancy rate is equal to 15 percent, (4) the rental rate increases by three percent annually, and (5) the appropriate discount rate is eight percent.[44] Assumptions (1) and (2) are taken from a letter sent from Cushman Realty Corporation to Wells Fargo Bank, dated September 16, 1998 (the "Cushman Letter"), while assumptions (3) through (5) are made by Prof. Grenadier and are not sourced to any document.[45]

32. The strike prices are the costs that Wells Fargo incurs if it exercises the purchase or extension options, and include non-recovered operating expenses, brokerage commissions, legal expenses, and capital and tenant improvement costs.[46] Since Prof. Grenadier assumes, for simplicity, that there are three 10-year extension options, his model requires that strike prices be calculated for each of the three extension option periods; thus, Prof. Grenadier calculates three strike prices, and denotes these in his model as E1, E2, and E3.[47]

33. Prof. Grenadier's calculation of E1, E2, and E3 relies primarily on the Cushman Letter and a financial analysis by Wells Fargo of the lease extension options, dated June 22, 2007 (the "Pro forma analysis"). In calculating tenant improvement costs, a component of the strike prices, Prof. Grenadier makes six assumptions: (1) there are 719,113 square feet available to rent, (2) the tenant allowance per square foot is $22.50, (3) the vacancy rate is 15 percent, (4) the average lease term is 7.5 years, (5) the discount rate is eight percent, and (6) the tenant allowance of

[43] Backup for Revised Expert Report of Steven R. Grenadier ("Garland Lease Extension Terms.XLS").
[44] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p.5 ¶¶ 21-24.
[45] With regards to his vacancy rate assumption, Prof. Grenadier states that "assuming a long-term 15% vacancy is a conservative assumption, as real estate markets generally equilibrate to vacancy rates below 10%." Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 5 ¶ 22.
[46] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p.6 ¶¶ 26-31.
[47] Ibid., p.6 ¶ 32; Backup for Revised Expert Report of Steven R. Grenadier ("Garland Lease Extension Terms.XLS").

$22.50 does not increase over time (i.e., the rate of inflation is zero percent).[48] The first two assumptions are taken from the Cushman letter, while assumptions (3) – (6) are not sourced. Prof. Grenadier also assumes that if the initial option is exercised in 2009, a capital investment of $35 million is required.[49] Since this cost only occurs when the first extension option is exercised, it affects the value of E1, but not the values of the second and third strike prices (E2 and E3).

34. For all other cost components of E1, E2, and E3, Prof. Grenadier relies on the Pro forma analysis, which provides the master lease rent payable by Wells Fargo, as well as estimates for operating expenses, recovered operating expenses, brokerage commissions, and legal expenses for 2009 through 2018.[50] As the 2009 through 2018 period corresponds to the first extension period (E1), Prof. Grenadier calculates E1 based on the values provided in the Pro forma analysis. To calculate E2, which corresponds to 2019 through 2028, and E3, which corresponds to 2029 through 2038, Prof. Grenadier inflates 2018 operating expenses and recovered operating expenses at three percent annually from 2019 through 2038, and fixes brokerage commissions and legal expenses at their 2018 value for 2019 through 2038 (i.e., he assumes an inflation rate of zero percent for these costs).[51] Prof. Grenadier then discounts using a discount rate of eight percent to calculate the present value of costs in each 10-year period.[52]

35. Step 0 of Table 1 below provides the values for S0, E1, E2, and E3 that Prof. Grenadier calculates and relies on in his analysis. Given his inputs, together with his volatility estimate, the estimated value of the purchase option is equal to $17.1 million and the estimated value of the extension option is $19.7 million. The subsequent rows in Table 1 correct a total of nine errors made by Prof. Grenadier, and in correcting these errors, give new values for S0, E1, E2, and E3, and the purchase and extension options.

[48] Revised Expert Report of Steven R. Grenadier, March 16, 2009, pp. 5-7 ¶¶ 22, 31 & 33.
[49] Ibid., p.6 ¶ 29.
[50] Wells Fargo Corporate Properties Group, Pro forma Financial Analysis, Garland Building. WFPEM013646A to WFPEM013647.
[51] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 6 ¶¶ 26, 28, and 30.
[52] Ibid., p. 7 ¶ 33.

Table 1: Corrections to Prof. Grenadier's Model Inputs

Steps	Description	Basis for Change	S0	E1	E2	E3	Purchase Option Value	Extension Option Value
0	Professor Grenadier's reported values		$ 27,689,936	$ (154,312,391)	$ (130,993,863)	$ (138,587,210)	$ 17,019,882	$ 19,883,762
1	15% vacancy rate applied to Pro forma forecast for 2009 - 2018	Corrects inconsistency in Prof. Grenadier's calculations	27,689,936	(156,945,370)	(126,426,793)	(132,449,450)	17,200,935	19,887,712
2	Legal expenses assumed to grow at 3% annually	Corrects inconsistency in Prof. Grenadier's calculations	27,689,936	(156,936,276)	(126,583,738)	(132,829,538)	17,182,396	19,875,779
3	Tenant improvement costs assumed to grow at 3% annually	Corrects inconsistency in Prof. Grenadier's calculations	27,689,936	(163,796,418)	(140,034,925)	(155,138,538)	15,716,444	18,606,675
4	Triple net rent assumed to equal $5.67 psf - previously assumed to equal $6 psf	Calculations made consistent with Cushman/KPMG	26,952,000	(163,796,418)	(140,034,925)	(155,138,538)	14,880,818	17,665,797
5	Operating expenses assumed to equal $8.10 psf - previously assumed to equal $16 psf	Calculations made consistent with KPMG	26,952,000	(159,897,263)	(134,794,787)	(148,096,231)	15,436,079	18,201,923
			Rental income commissions deducted	*Excludes rental income commissions but includes commissions on recovered operating expenses*				
6	Commissions assumed to be 5% of full service gross rent	Calculations made consistent with KPMG/Pro forma	25,604,400	(155,185,808)	(130,973,123)	(145,470,372)	14,209,151	16,824,882
7	Discount to June 1 rather than to December 31	Rents and expenses paid throughout each year	26,322,274	(160,152,184)	(136,244,913)	(151,152,614)	14,463,507	17,161,722
8	Rental rates are locked when leases are signed	Calculations made consistent with KPMG	24,832,951	(160,152,184)	(136,244,913)	(151,152,614)	12,741,413	15,214,647
Final	Vacancy rate assumed to equal 10% - previously assumed to equal 15%	Calculations made consistent with KPMG	$ 26,293,713	$ (158,338,442)	$ (133,807,395)	$ (147,876,793)	$ 14,722,475	$ 17,413,848

Notes:

0 Professor Grenadier's reported values. Source [2].

1 An inconsistency in Professor Grenadier's calculations is fixed. Professor Grenadier assumes a vacancy rate of 15%. However, he uses operating expenses and recovered operating expenses from the Pro forma analysis which are based on different vacancy assumptions. The Pro forma figures are recalculated to be consistent with Professor Grenadier's vacancy assumption. Source [1], p. 5 & source [5].

2 Professor Grenadier assumes a fixed amount for legal expenses, as found in the Pro forma analysis. Instead, legal expenses are assumed to rise at 3% a year. For the years 2009-2018, total legal expenses are set equal to the total 10-year figure found in the Pro forma analysis, but calibrated at a 3% growth rate for costs per year. Source [1], p. 6 & source [5].

3 Professor Grenadier assumes tenant improvement costs are equal to $22.50 psf (the midpoint of the range found in the Cushman letter) for the entire analysis period. Instead, tenant improvement costs are assumed to increase at 3% annually from December 31, 1998. Source [1], p. 6, source [3] & source [8].

4 Professor Grenadier assumes $6 psf triple net rent, the midpoint of the range provided in the Cushman letter. However, the Wells Fargo Bank Property Summary for the Garland Center uses a rate of $5.67 as the base rental rate for all new leases in 1998. The KPMG report also uses a rate lower than the midpoint. This rate of $5.67 is inflated at 3% annually starting from January 1, 1999. Source [1], p. 5, source [3] & source [8].

5 Professor Grenadier for operating expenses and recovered operating expenses, uses a rate of $16 psf, which is found in the Pro forma analysis. Instead a value of $8.10 psf for 1998 found in the Wells Fargo Bank Property Summary for the Garland Center is used. This rate is inflated at 3% annually starting from January 1, 1999. Source [1], p. 6, source [3] & source [5].

6 The Pro forma analysis states that brokerage commissions amount to $10.8 million and reports its methodology for calculating commissions as "5% of the previous 10 year rental income total." It is unclear whether "rental income" refers to triple net rent or gross rent. It is also unclear as to which 10 year period is used in calculating brokerage commissions. Furthermore, the Pro forma analysis apportions total commissions equally among the years 2009-2018. The KPMG report provides a more transparent methodology--6% of full service gross rent (triple net rent plus recovered operating expenses) over the lifetime of each lease. The KPMG methodology is used instead but at the 5% rate found in the Pro forma analysis. Source [1], p. 6, source [4], p. WFC-36-0974, & source [5].

7 Professor Grenadier discounts all calculations to the end of the first year, which assumes that all revenues are received and expenses are incurred at the end of the year. Most expenses are incurred and recovered at the beginning of each month. Sublease payments are also due at the beginning of each month. Furthermore, payments on the master lease are semi-annual, due on the last day of February and the last day of August. Therefore calculations are instead discounted to June 1. Source [1], p. 7 & source [7], pp. WFP-02298 - WFP-02299.

8 Professor Grenadier assumes that triple net rent rates are inflated at 3 percent annually. However, for active subleases in the Garland building, lease rates do not increase every year. Instead, for leases with a term of five years, lease rates are fixed, and for leases with a term of ten years, rates increase approximately every five years. Therefore, I assume that rental rates increase every five years on average. Source [1], p. 5 & source [6].

Final The vacancy rate assumption for the model must account for the time it takes to lease space that is currently vacant or expected to become vacant and for unexpected vacancy and credit loss. The KPMG report assumes a maximum 10% allowance for unexpected vacancy and makes an additional allowance for expected vacancy. Further, Professor Grenadier states "real estate markets generally equilibrate to vacancy rates below 10%." (Source [1], p. 5 ¶ 22). Considering the KPMG report and Professor Grenadier's position, conservatively, I use a vacancy rate of 10 percent. Source [4], p. WFC-36-0975.

Sources:

[1] Revised report of Steven R. Grenadier, Ph.D., March 16, 2009.

[2] Backup for revised report of Steven R. Grenadier, Ph.D., March 16, 2009.

[3] Wells Fargo Bank Leasehold Equity Analysis. WFP-03744 - WFP-04037, p. WFP-03748.

[4] KPMG agreed upon procedures report, December 17, 1998. WFC-36-0971 - WFC-36-0978.

[5] Wells Fargo Corporate Properties Group, Pro forma Financial Analysis, Garland Building. WFPEM013646A - WFPEM013647.

[6] Wells Fargo Direct Lease and Property Summary, Garland Center, March 3, 2000. WFC-BP-008-0441 - WFC-BP-008-0448.

[7] Sublease agreement between RML Leasing Corp., as Lessor and First Interstate Bank of California, as Lessee, January 20, 1984. WFP-02232 - WFP-02345.

[8] Letter from Cushman Realty Corporation, September 16, 1998. WFC-36-0126 & WFC-36-0124.

36. The first error, identified as Step 1 in Table 1, corrects for an inconsistency in Prof. Grenadier's calculations. Specifically, in calculating S0 and tenant improvement costs, Prof. Grenadier assumes that the vacancy rate of the Garland building is equal to 15 percent.[53] However, Prof. Grenadier obtains estimates of operating and recovered operating expenses from the Pro forma analysis, which makes different vacancy rate assumptions for 2009 through 2018. Specifically, in 2010, 2012 through 2014, 2016, and 2017, the Pro forma analysis assumes a vacancy rate of approximately six percent, and in all other years from 2009 through 2018, the Pro forma analysis assumes a vacancy rate of approximately 18 percent.[54] Thus, in calculating E1, inconsistently, Prof. Grenadier calculates tenant improvement costs assuming a 15 percent vacancy rate, and operating expenses assuming six and 18 percent vacancy rates.

37. Further, in estimating the value of operating expenses and recovered operating expenses for 2019 through 2038, Prof. Grenadier relies on the value of these expenses in 2018, which is based on a vacancy rate of 18 percent. By using a calculated value for tenant improvement costs which relies on a 15 percent vacancy rate assumption, and projected non-recovered operating expenses based on estimates from the Pro forma analysis, he assumes that the vacancy rate is both 15 percent and 18 percent in future periods. I correct this inconsistency and assume that the vacancy rate is always equal to 15 percent. In making this correction, the values for E1, E2, and E3 change slightly, and the estimated values of both the purchase and extension options increase.

38. Steps 2 and 3 correct for additional inconsistencies in Prof. Grenadier's calculations. Prof. Grenadier appropriately inflates the rental revenue received by Wells Fargo from its subtenants, as well as operating and recovered operating expenses, but he does not inflate tenant improvement costs, brokerage commissions, or legal expenses.[55] To correct for this inconsistency, I inflate tenant improvement costs, brokerage commissions, and legal expenses, in addition to those inputs that Prof. Grenadier previously assumed, at three percent annually. This increases the absolute values of E1, E2, and E3, and correspondingly decreases the estimated values of the purchase and extension options.

[53] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 5 ¶ 22.
[54] Wells Fargo Corporate Properties Group, Pro forma Financial Analysis, Garland Building. WFPEM013646A to WFPEM013647.
[55] Backup for Revised Expert Report of Steven R. Grenadier ("Garland Lease Extension Terms.XLS").

39. Steps 4 and 5 ensure that Prof. Grenadier's assumptions are consistent with those used in KPMG's Wells Fargo Bank Leasehold Equity Analysis and a letter by KPMG to Wells Fargo, dated December 17, 1998 (collectively referred to as the "KPMG letter"),[56] and by Cushman in developing its market evaluation of the Garland building in 1998. With respect to market rents, Prof. Grenadier uses a value of $6 per square foot, which is the mid-point of the range of market rents provided by Cushman.[57] However, the KPMG letter assumes in its analysis that rental rates for new subleases were $5.67.[58] As such, I assume that rental rates for new subleases are equal to $5.67 in 1998 and inflate this rental rate at an annual rate of three percent.

40. For operating expenses, Prof. Grenadier relies on the 2007 Pro forma analysis and assumes that such expenses are equal to $16 per square foot.[59] However, the KPMG letter assumes that operating expenses were equal to $8.10 per square foot in 1998.[60] As this letter presumably reflected Wells Fargo's thinking at the time at which the Garland property was transferred to Charter, I instead assume that operating expenses were $8.10 in 1998, and allow this value to rise with an annual inflation rate of three percent. The net effect of Steps 4 and 5 is to decrease S0, E1, E2, and E3, and to decrease the estimated value of both the purchase and extension options.

41. Step 6 ensures that Prof. Grenadier's analysis is consistent with both the Pro forma analysis and the KPMG letter. In his expert report, Prof. Grenadier assumes that brokerage commissions and other professional fees remain fixed at $1,161,025 per year from 2009 through 2038.[61] Although he obtains this value from the Pro forma analysis, his use of it is not consistent with its methodology or that of KPMG. Specifically, both the KPMG letter and the Pro forma analysis assume that commission costs vary with sublease revenue; the KPMG letter assumes that commissions are equal to six percent of full service gross rent over the lifetime of the lease,[62] while the Pro forma analysis assumes that commissions for 2009 through 2018 are equal to five

[56] KPMG agreed upon procedures report, December 17, 1998. WFC-36-0971 to WFC-36-0978 (at p. WFC-36-0974); Wells Fargo Bank Leasehold Equity Analysis. WFP-03744 - WFP-04037 (at p. WFP-03748).
[57] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 5 ¶ 21.
[58] Wells Fargo Bank Leasehold Equity Analysis. WFP-03744 to WFP-04037 (at p. WFP-03748).
[59] Wells Fargo Corporate Properties Group, Pro forma Financial Analysis, Garland Building. WFPEM013646A to WFPEM013647.
[60] Wells Fargo Bank Leasehold Equity Analysis. WFP-03744 to WFP-04037 (at p. WFP-03748).
[61] Note that commissions account for $1,087,719 of the $1,161,025. Backup for Revised Expert Report of Steven R. Grenadier ("Garland Lease Extension Terms.XLS").
[62] KPMG agreed upon procedures report, December 17, 1998. KPMG-BOX02-1619 to KPMG-BOX02-1626 (at p. KPMG-BOX02-1622).

percent of the previous 10-year rental income total. I use KPMG's methodology since it is unclear whether the 10-year rental income total used in the Pro forma analysis is triple net rent or gross rent, but to be conservative, I assume that commissions are equal to five percent, as used in the Pro forma analysis.

42. This reduces the value of S0 by five percent. In making this change, I remove rental income commissions from the calculation of E1, E2, and E3, but include commissions on recovered operating expenses as KPMG assumes that commissions are collected on both triple net rental income and recovered operating expenses. In making these changes, the estimated magnitudes for S0, E1, E2, and E3, and the purchase and extension options decrease.

43. Step 7 changes the date at which both rental revenues and costs are discounted. Prof. Grenadier discounts at the end of each year, which assumes that all expenses and costs are incurred on December 31 of each year.[63] However, sublease rental revenues are received by Wells Fargo on a monthly basis, which indicates that discounting at the middle of the year (June 1st) is more appropriate.[64] Furthermore, Wells Fargo's master lease payments are due in two installments each year – the first on the last day of February and the second on August 31st.[65] The mid-point of the two payments also falls on June 1st, providing further support for discounting to June 1st, as opposed to December 31st.

44. Step 8 changes the manner in which lease rates increase over time. For sublease rental income, Prof. Grenadier assumes that triple net rent rates grow at three percent annually.[66] However, for active subleases in the Garland building, lease rates do not increase every year; instead, lease rates are fixed for leases with a term of five years, and for leases with a term of ten years, rates increase approximately every five years.[67] I assume that rental rates increase every

[63] Backup for Revised Expert Report of Steven R. Grenadier ("Garland Lease Extension Terms.XLS").
[64] See for example: The Garland Center Sublease by and between Charter Holdings Inc., ("Sublandlord") and Bank of America, NT & SA ("Subtenant"), May 18, 1999. WFC-LA-002-0001 to WFC-LA-002-0540 (at p. WFC-LA-002-0024).
[65] Sublease Agreement between RML Leasing Corp., as Lessor and First Interstate Bank of California as Lessee, January 20, 1984. WFP-02232 to WFP-02345, WFP-02311 to WFP-02312.
[66] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 5 ¶ 23.
[67] Wells Fargo Direct Lease and Property Summary, Garland Center, March 3, 2000. WFC-BP-008-0441 to WFC-BP-008-0448.

five years on average, an approach which is consistent with the manner in which KPMG models rent increases.[68]

45. Finally, Prof. Grenadier assumes a vacancy rate of 15 percent in calculating S0 and tenant improvement costs.[69] The vacancy rate assumption for the model must account for the time it takes to lease space that is currently vacant or expected to become vacant, and for unexpected vacancy and credit loss. The KPMG letter assumes a maximum 10 percent allowance for unexpected vacancy and makes an additional allowance for expected vacancy. Further, Professor Grenadier states "real estate markets generally equilibrate to vacancy rates below 10%."[70] Considering the KPMG letter and Professor Grenadier's position, conservatively, I use a vacancy rate of 10 percent.[71] This increases S0, as the property is now more valuable to Wells Fargo, and correspondingly increases the estimated value of both the purchase and extension options.

46. After making all changes to Prof. Grenadier's input calculations, the estimated value of the purchase option decreases from $17.1 million to $15.0 million, and the estimated value of the extension option decreases from $19.7 million to $17.2 million. This information is summarized below in Table 2.

Table 2: Effect of Corrected Input Values on Estimated Values of the Purchase and Extension Options

Description	Volatility (Percent)	Purchase Option Value	Extension Option Value
Professor Grenadier's reported values	35.0	$ 17,054,121	$ 19,678,290
Corrected inputs (S0, E1, E2, and E3)	35.0	$ 14,722,475	$ 17,413,848

4.2. Volatility

47. Prof. Grenadier uses an estimate of the volatility of individual office property values to value the lease extension and purchase options. His estimate of 35 percent is derived from data presented in "Volatility, Mortgage Default, and CMBS Subordination" (February 2008) by

[68] I calculate rental income assuming rental rates increase for one fifth of leased space each year. This change reduces S0, as well as the value of both the purchase and extension options. See KPMG-BOX02-1619 to KPMG-BOX02-1626 (at p. KPMG-BOX02-1622).
[69] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p.5 ¶ 22.
[70] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p.5 ¶ 22.
[71] KPMG agreed upon procedures report, December 17, 1998. WFC-36-0971 to WFC-36-0978 (at p. WFC-36-0975).

Downing, Stanton, and Wallace.[72] The volatility estimates reported in Downing et al. (2008) are implied from non-seasoned fixed rate loans securitized into commercial mortgage-backed securities (CMBS) pools.[73] Given a theoretical model to value these loans, Downing et al.'s (2008) implied volatility estimate is that which makes the model price of a newly originated loan equal par assuming all other model parameters are correctly specified. Since at a particular point in time there may be many loans on office properties originated and then securitized, the median of these volatilities is used.

4.2.1. The Meaning of 35 Percent Volatility

48. Prof. Grenadier's volatility estimate is based on a methodology which assumes that property values are log-normally distributed.[74] If property values are log-normally distributed, a 35 percent volatility means that there is a five percent chance that a building will experience a 69 percent (1.96 × 35%) increase or decrease in value from its expected value over a typical year.[75] Similarly, there is a 50 percent chance that a building value will rise or fall by 24 percent (0.675 × 35%) in a typical year.[76]

49. These movements in the value of an office property are implausibly high. The volatility estimate of 35 percent used by Prof. Grenadier is higher than the 30 percent implied volatility of Google common stock, which I estimated previously. By comparison, Ciochetti and Vandell (1999) report an implied office property value volatility of only 16.6 percent.[77]

4.2.2. Building Value Volatility vs. Lease Rate Volatility

50. For a call option written on the value of an office building with strike price being the price at which the property can be purchased, building value volatility is the correct measure of volatility to value the option. However, because the lease extension option and purchase option

[72] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 8 ¶ 41. Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008 (at p. 31).
[73] Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 7.
[74] Black, F. and M. Scholes, 1973, "The Pricing of Options and Corporate Liabilities," *The Journal of Political Economy*, Vol. 81 (3), pp. 637-654 (at pp. 639-40).
[75] Edwin Mansfield, Statistics for Business and Economics: Methods and Applications 3rd Ed. (W.W. Norton & Company 1987) pp. 162-4, A8.
[76] Ibid.
[77] Ciochetti, B. and K. Vandell, 1999, "The Performance of Commercial Mortgages," *Real Estate Economics*, Vol. 27 (1), pp. 27-61 (at p. 38).

are contingent on the prevailing *lease rate*, the valuation of these options requires a measure of lease rate volatility. In simple terms, Wells Fargo will exercise the option when it is in its interest to do so. Since it is in Wells Fargo's interest to exercise the option when the market lease rate is higher than the extension lease rate, this exercise choice directly depends on fluctuations in lease rates. The extent of these fluctuations are better captured by the volatility of lease rates than the volatility of building values. As such, lease rate volatility should be used to value both the purchase and extension options.

4.2.3. Los Angeles-Specific vs. National Data

51. Prof. Grenadier's estimate of individual property volatility does not measure the volatility of an office building located in Los Angeles. Instead, his estimate is the median of the volatilities of individual buildings whose underlying mortgages are pooled in a particular CMBS.[78] These pools tend to be geographically diversified so that investors will not be excessively exposed to a particular region of the country.[79]

52. However, the volatility of commercial real estate varies geographically. For example, relying on quarterly commercial real estate price data from 1994 through 2003, Plazzi, Torous and Valkanov (2006) document that the volatility of excess returns to office properties, that is, the return to collecting rents and holding an office building for a period of time measured relative to the return to a corresponding Treasury bill investment, varies across fifty-three metropolitan statistical areas in the U.S.[80] For instance, they estimate that this volatility is equal to approximately two percent in Pittsburgh, Pennsylvania, seven percent in Los Angeles, California, 12 percent in San Francisco, California, and 16 percent in Charlotte, North Carolina.[81] Of particular relevance to valuing the lease extension and purchase options associated with the Garland property, Buetow and Albert (1998) find that the volatility of commercial real estate lease rates varies geographically.[82] Specifically, in using quarterly market rent data from 1985

[78] Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 3.
[79] Esaki, H. and M. Goldman, 2005, "Commercial Mortgage Defaults: 30 Years of History," *CMSA*, pp. 21-29 (at p. 22).
[80] Plazzi, A., Torous, W., and R. Valkanov, 2006, "Expected Returns and the Expected Growth in Rents of Commercial Real Estate," pp. 1-53 (at pp. 51-53).
[81] Ibid.
[82] Albert, J. and G. Buetow, 1998, "The Pricing of Embedded Options in Real Estate Lease Contracts," *Journal of Real Estate Research*, Vol. 15 (3), pp. 253-265 (at pp. 259-260).

through 1994, they find that the volatility of rent rates is approximately three percent in Atlanta Georgia, five percent in Los Angeles, California, and seven percent in Boston, Massachusetts.[83]

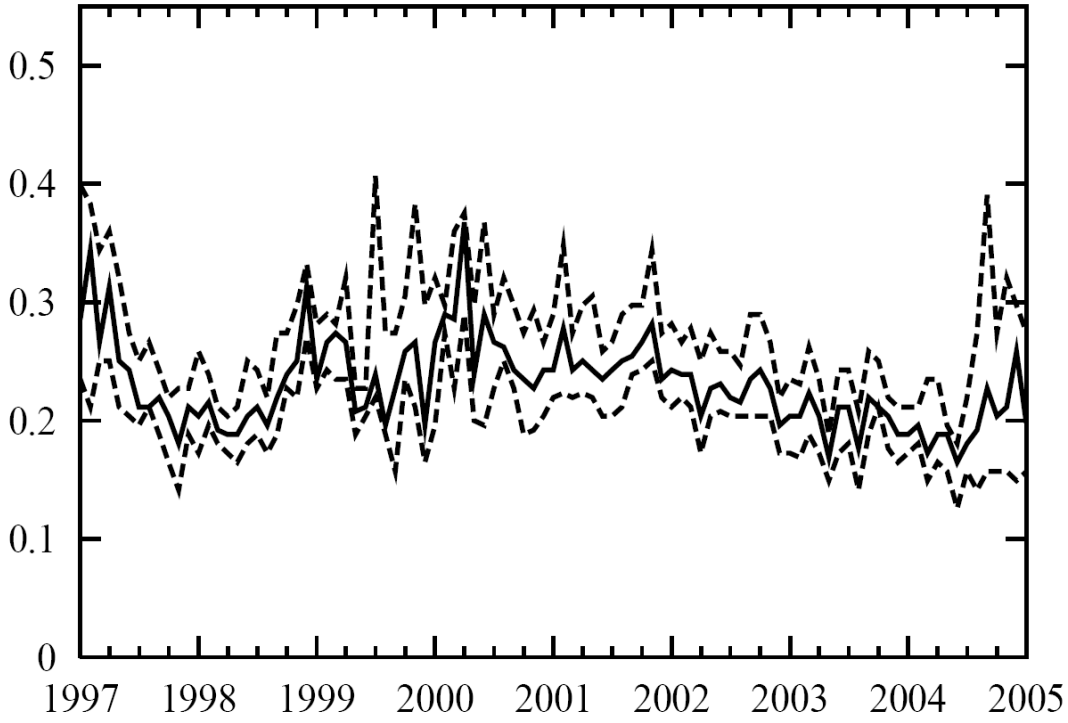
53. Given the geographical variance in commercial real estate volatility, the implied volatility estimate from Downing et al. (2008), which is based on commercial mortgages for properties located throughout the United States, is unlikely to be an accurate estimate of Los Angeles-specific volatility. Thus, in valuing the extension and purchase options associated with the Garland building master lease, a Los Angeles-specific volatility estimate, as opposed to the estimate from Downing et al. (2008), should be used.

4.2.4. Implied Building Value Volatility is Not Equal to 35 Percent

54. Prof. Grenadier's statement that "[Downing et al. (2008)] estimated the volatility of individual office properties as of 1999 to be just about 0.35" is based on a visual examination of data plotted in Downing et al. (2008), which provides monthly median implied volatilities for individual office properties from 1997 through 2005. This figure is reproduced as Figure 6 below.[84] Note that the solid line provides the median implied volatility, while the bottom dashed line plots the 25th percentile and the top dashed line plots the 75th percentile of the implied volatility distributions.

[83] Albert, J. and G. Buetow, 1998, "The Pricing of Embedded Options in Real Estate Lease Contracts," *Journal of Real Estate Research*, Vol. 15 (3), pp. 253-265 (at p. 260).
[84] Revised Expert Report of Steven R. Grenadier, March 16, 2009, p. 8 ¶ 41; Deposition of Steven R. Grenadier, p. 74; Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 31.

Figure 6: Monthly Implied Volatilities for Office Properties – Figure 3 of Downing et al. (2008)[85]



55. Although these data may appear to be only reported quarterly since the x-axis is delimited by quarters, the data are actually reported monthly. This can be seen by looking at the data for a given year – for example, 1999. By counting the number of inflection points for 1999, that is, where the slope of the data series changes, it is clear that there are more than four such points. By sufficiently enlarging the figure, it is apparent that there are 12 data points for 1999.

56. To accurately determine the implied volatility for January 1999, I use the Grabit function in the computer software Matlab, which precisely extracts data point values from a plot such as Figure 3.[86] The implied volatilities that are obtained using this function are provided below in Table 3 for October 1998 through March 1999.

[85] Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 31.

[86] The function can be downloaded at http://www.mathworks.com/matlabcentral/fileexchange/7173. To extract data points from an image file, the dimensions of the axes are calibrated by selecting four points on the image. Next, the user clicks data points on the plot. The data that are obtained from this process are stored in Matlab and can be exported to other programs, such as Microsoft Excel.

Table 3: Monthly Implied Volatilities for Office Properties (October 1998 – March 1999)

Year	Month	Implied Volatility (Percent)
1998	October	23.5
	November	25.3
	December	31.2
1999	January	24.4
	February	26.3
	March	27.3

57. The data indicate that the implied volatility for January 1999 is equal to 24.4 percent, which is substantially lower than the value of 35 percent used by Prof. Grenadier. Prof. Grenadier appears to have instead relied on the implied volatility associated with December 1998, which is equal to 31.2 percent. However, this is not consistent with his attempt to select an implied volatility for individual office properties as of the beginning of 1999.[87] Correcting this error and using an implied volatility equal to 24.4 percent, the estimated value of the purchase option decreases from $14.7 to $5.5 million, while the extension option estimated value decreases from $17.4 to $6.2 million. This information is summarized below in Table 4.

Table 4: Effect of Revision to Volatility Value on Estimated Values of Purchase and Extension Options

Description	Volatility (Percent)	Purchase Option Value	Extension Option Value
Professor Grenadier's reported values	35.0	$ 17,054,121	$ 19,678,290
Corrected inputs (S0, E1, E2, and E3)	35.0	14,722,475	17,413,848
Corrected building value volatility	24.4	$ 5,475,880	$ 6,176,737

4.2.5. Problems with Downing, Stanton, and Wallace's measure

58. Downing et al. (2008) apply a methodology articulated by Titman and Torous (1989) to imply building value volatilities from commercial mortgage data.[88] In this methodology, the value of a commercial mortgage is assumed to depend on the prevailing rate of interest and the

[87] Revised Expert Report of Steven R. Grenadier, March 16, 2009, pp. 1, 7-8 ¶¶ 8 & 41.

[88] Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 6; Titman, S. and W. Torous, 1989, "Valuing Commercial Mortgages: An Empirical Investigation of the Contingent-Claims Approach to Pricing Risky Debt," *The Journal of Finance*, Vol. 44 (2), pp. 345-373.

underlying building value.[89] Interest rate dynamics are given by the Cox, Ingersoll, and Ross (1985) specification, and, following Merton (1974), building values are assumed to be log-normally distributed.[90] Given the observed market price of a commercial mortgage and all parameters of the underlying model except for volatility, the implied building value volatility is the volatility estimate which makes the value of the mortgage equal to its market price.

59. The Titman and Torous (1989) methodology relies on the Merton (1974) risky debt valuation model.[91] This model recognizes that the owner of an office building financed by a commercial mortgage has an option to default on its mortgage. If the value of the building is less than what is owed on the mortgage's maturity date, the borrower will default and assign ownership of the building to the lender. This option held by the borrower has value. The resultant premium received by the lender reduces the amount that would be lent to an otherwise identical, but default-free, borrower.

60. However, empirical work finds that the Merton model yields unreasonably high volatility estimates.[92] Because of this deficiency of the Merton model, recent research has attempted to derive more realistic risky debt valuation models.[93]

61. One way to do so is to more realistically model the foreclosure process in the event of default. Foreclosure costs are significant and include legal and administrative costs such as court costs, broker commissions, deterioration of the property, and lost revenues.[94] Brown, Ciochetti,

[89] Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 6.
[90] Cox, J., Ingersoll, J., and S. Ross, 1985, "A Theory of the Term Structure of Interest Rates," *Econometrica*, Vol. 53 (2), pp. 385-407; Merton, R., 1974, "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *The Journal of Finance*, Vol. 29 (2), pp. 449-470.
[91] Titman, S. and W. Torous, 1989, "Valuing Commercial Mortgages: An Empirical Investigation of the Contingent-Claims Approach to Pricing Risky Debt," *The Journal of Finance*, Vol. 44 (2), pp. 345-373 (at p. 345).
[92] Jones, E., Mason, S., and E. Rosenfeld, 1984, "Contingent Claims Analysis of Corporate Capital Structures: An Empirical Investigation," *The Journal of Finance*, Vol. 39 (3), pp. 611-625 (at p. 623).
[93] Bohn, J., 2000, "A Survey of Contingent-Claims Approaches to Risky Debt Valuation," *Journal of Risk Finance*, Vol. 1 (3), pp. 53-70.
[94] Brown, D., Ciochetti, B., and T. Riddiough, 2006, "Theory and Evidence on the Resolution of Financial Distress," *The Review of Financial Studies*, Vol. 19 (4), pp. 1357-1397 (at p. 1384); Ang, J., Chua, J., and J. McConnell, 1982, "The Administrative Costs of Corporate Bankruptcy: A Note," *The Journal of Finance*, Vol. 37 (1), pp. 219-226 (at p. 224); Pulvino, T., 1998, "Do Asset Fire Sales Exist? An Empirical Investigation of Commercial Aircraft Transactions," *The Journal of Finance*, Vol. 53 (3), pp. 939-978 (at p. 939); Weiss, L., 1990, "Bankruptcy Resolution: Direct Costs and Violation of Priority of Claims," *Journal of Financial Economics*, Vol. 27, pp. 285-314 (at p. 290).

and Riddiough (2006) estimate that distressed commercial real estate obtained through foreclosure sold at a discount to its fundamental value.[95]

62. Downing et al. (2008) ignore these foreclosure costs, which biases upward their implied volatility estimates.[96] Lenders take these foreclosure costs into account when setting commercial mortgage rates. In anticipation of receiving less in the event of default, lenders charge more or, equivalently, lend less. Any methodology which ignores these foreclosure costs will then erroneously attribute this higher commercial mortgage rate to higher building volatility.

63. Brown et al. (2006) document that, on average, approximately 30 months of time are required to foreclose a financially distressed commercial property.[97] This lengthens the time it takes lenders to be paid off in the event of default. To compensate for receiving less in present value terms, lenders set a higher commercial mortgage rate which, when not properly modeled, implies a higher building volatility estimate.

64. Table 5 presents the Brown et al. (2006) estimate of foreclosure costs as a share of asset value, referred to as transfer value, with successive adjustments. The first row presents their preliminary estimate of 24.4 percent, given an average asset sale price of 75.6 percent of assessed value.[98] Subsequent rows adjust this preliminary estimate to include capital expenditures paid by the lender during foreclosure, the discounting of expenses, and to restrict to average office building characteristics. The result is a foreclosure cost estimate of 24.3 percent specifically for office properties.

[95] Brown, D., Ciochetti, B., and T. Riddiough, 2006, "Theory and Evidence on the Resolution of Financial Distress," *The Review of Financial Studies*, Vol. 19 (4), pp. 1357-1397 (at p. 1386).
[96] Downing et al (2008) provide no discussion of this foreclosure process.
[97] Brown, D., Ciochetti, B., and T. Riddiough, 2006, "Theory and Evidence on the Resolution of Financial Distress," *The Review of Financial Studies*, Vol. 19 (4), pp. 1357-1397 (at p. 1384).
[98] Ibid (at p. 1386).

Table 5: Adjustments to Brown et al. (2006) Commercial Building Foreclosure Cost Estimate[99]

Steps	Description	Basis of Change	Asset Sale Price (A)[§]	Transfer Value (TV)[§]	Capital Expenditures (CapX)[§]	Asset Ratio (AR)= A / (TV+CapX)	Distress Discount Estimate (1-AR)
0	Brown, Ciochetti, and Riddiough (BCR) 2006 reported values		0.756	1	0	0.756	0.244
1	Capital expenditures assumed to equal 14.2% of assets and average time to asset sale assumed to equal 27.3 months	Calculations include lender expenditures	0.756	1	0.107	0.683	0.317
2	Capital expenditures discounted from time of asset sale at 10%	Calculations made consistent with BCR	0.756	1	0.086	0.696	0.304
3	Capital expenditures equally apportioned over average time to asset sale and discounted annually to July 1 at 10%	Expenses paid throughout each year	0.756	1	0.096	0.690	0.310
4	Capital expenditures assumed to equal 19.6% of assets with average time to asset sale of 30.2 months	Calculation made consistent with average office properties	0.756	1	0.132	0.668	0.332
5	Capital expenditures discounted annually at 8%	Calculations made consistent with Prof. Grenadier Report	0.756	1	0.135	0.666	0.334
Final	Asset sale price adjusted upwards by 13.6% for market trend	Calculations made consistent with BCR	0.859	1	0.135	0.757	0.243

Notes:

§ The transfer value (TV) is the lender's estimate of the property's fundamental value at the time of foreclosure. Asset sale price (A) is the amount the lender received at sale of the asset at the end of the holding period as a share of the TV. Capital expenditures (CapX) are the expenses paid on the property over the asset holding period including major property maintenance expenses, redevelopment costs, tenant improvements, and leasing commissions as a share of TV. The asset ratio (AR) is the ratio of asset's value at the end of the holding period to its value at the beginning plus all capital expenditures. The distress discount (1-AR) is the cost of foreclosure.

0 The transfer value was normalized to 1. Asset sale price and capital expenditures are defined relative to transfer value. Source [1], p. 1386.

1 Capital expenditures included in asset ratio according to BCR analysis. The 14.2% capital expenditure share is the average lender expenditure during foreclosure for all commercial properties, with an average duration of 27.3 months from initiation of foreclosure through asset sale. Source [1], p. 1384.

2 Capital expenditures discounted at a compounded 10% rate for 27.3 months. Published resulting asset ratio is 0.705. Source [1], p. 1386.

3 Capital expenditures are equally apportioned across time to asset sale and discounted annually to July 1at the BCR rate of 10%. Source [1], p. 1386.

4 Capital expenditures adjusted to average office properties characteristics. Lender capital expenditures during foreclosure averaged 19.6% of final asset sale price for office properties and foreclosure took an average of 30.2 months for office properties. Source [1], p. 1384.

5 Consistent with the Revised Grenadier Report, an 8% discount rate is used. Source [2], p. 5.

Final BCR adjust the asset sale price for declining market effects. The average increase in asset sale price (13.6% = 0.801 / 0.705) was applied to asset sale price. Source [1], p. 1386.

Sources:

1 Brown, David T., Brian A. Ciochetti, and Timothy J. Riddiough. 2006. Theory and evidence on the resolution of financial distress. *The Review of Financial Studies* 19(4): 1357-97.

2 Revised Report of Steven R. Grenadier, Ph.D., March 16, 2009.

65. It is beyond the scope of this report to replicate the Downing et al. (2008) analysis and take into account these foreclosure costs. Instead, I provide a simple numerical example below to estimate the approximate effects of ignoring foreclosure costs.

66. In this example, the current value of an office building is assumed to be $100 and its volatility is set to the office building value volatility estimate of 24.4 percent for January 1999 as reported in Figure 3 of Downing et al. (2008). The building is financed with a 10-year interest only loan with a current value of $67. The 10-year maturity is the average maturity of office loans in the Downing et al. (2008) sample, while the average loan-to value (LTV) ratio of their

[99] The average foreclosure cost for office buildings is calculated through several adjustments to the preliminary Brown et al. (2006) estimate in successive rows of Table 5. First, as in Brown et al. (2006), capital expenditures are included in the calculation of foreclosure costs to account for average lender expenses in foreclosure and asset sale. Inclusion of these costs increased the estimate of foreclosure costs to 31.7 percent, or 31.0 percent if discounted annually to July 1 at 10 percent as used in Brown et al. (2006). Average office building capital expenditures and time to asset sale replaced all commercial building characteristics in Step 4. Office buildings had greater capital expenditures (19.6 vs. 14.2 percent) and time to asset sale (30.2 vs. 27.3 months) increasing foreclosure costs. To be consistent with Prof. Grenadier's Revised Report, capital expenditures were discounted at 8 percent in Step 5. The final step was a market trend adjustment to the asset sale price used in Brown et al. (2006). On average, foreclosure costs amount to 24.3 percent of an office building's value in default.

sampled office loans is 67 percent.[100] However, once 24.3 percent foreclosure costs are assumed, in addition to assuming that 30.2 months are needed to foreclose on the property in the event of default,[101] I find that the current observed loan value of $67 is consistent with only a 19.5 percent building volatility. The increase in building volatility from 19.5 to 24.4 percent is due to erroneously ignoring foreclosure costs that are taken into account when setting observed loan rates.[102]

67. With a building value volatility of 19.5 percent, the estimated value of the purchase option decreases to $2,378,427, and the estimated value of the extension option decreases to $2,792,304.

4.2.6. Historical Lease Rate Data

68. The lease extension and purchase options are options on the lease rate. Accordingly, a measure of lease rate volatility is needed to properly value these options. Since market prices of derivatives written on lease rates are not available, implied volatility estimates are not available. Therefore, I use historical lease rate data to estimate lease rate volatility.

69. The CoStar Group makes available lease rate data for commercial real estate located in a number of geographical markets across the United States.[103] Data are collected for both direct leases, as well as sublets. CoStar samples actual lease rates charged for renting space in a variety of commercial property types, including office, retail, and multi-family. The sampled property types are of varying quality, including class A and B properties.[104] The data are a weighted average, the weights being the amount of space leased, of actual rental rates for a particular property type located in a given market.[105] They are not smoothed. Rather, raw adjusted data are

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[100] Downing, C., Stanton, R., and N. Wallace, "Volatility, Mortgage Default, and CMBS Subordination," February 19, 2008. p. 20.
[101] Brown, D., Ciochetti, B., and T. Riddiough, 2006, "Theory and Evidence on the Resolution of Financial Distress," *The Review of Financial Studies*, Vol. 19 (4), pp. 1357-1397 (at p. 1384).
[102] Rather than assuming the building is financed with a 10-year interest only loan, alternatively I consider a 10-year pure discount bond originally modeled by Merton (1974). Under these same conditions, taking into account the foreclosure process reduces the implied building volatility from 24.4 percent to 18.7 percent.
[103] CoStar COMPS Professional brochure. http://www.costar.com/uploadedFiles/Our_Products/Comps/CoStar_Brochure_COMPS.pdf. Accessed May 13, 2009.
[104] CoStar COMPS Professional brochure. http://www.costar.com/uploadedFiles/Our_Products/Comps/CoStar_Brochure_COMPS.pdf. Accessed May 13, 2009.
[105] Email from Nan Eckman to Walter Torous. "RE: FW: Re: lease rates (#8642-132604407-5787)." May 4, 2009.

reported quarterly to account for changing market conditions.[106] The lease rate data do not pertain to a specific term to maturity of lease contract, but reflect the actual terms of leases signed.[107] CoStar also takes into account any escalation clauses contained in a lease contract as well as any concessions offered to the lessee.[108] Currently, CoStar tracks approximately over seven billion square feet of space for lease in the United States.[109]

70. I use the CoStar data to calculate multiple estimates of the lease volatility as of the beginning of 1999 for the region containing the Garland building. My first set of calculations is based on the sublease rental rates tracked by CoStar. I chose sublease rental rates because, in 1998, Wells Fargo sublet its (non-vacant) space in the Garland building.[110] I calculated the volatility of sublease rates for class A office buildings in downtown Los Angeles to be approximately 13.6 percent, and that for sublease rates in greater Los Angeles to be approximately 8.3 percent.[111, 112] The advantage of the downtown calculation is that it reflects trends in the area closest, geographically, to the Garland building. The disadvantage of the downtown calculation is that the average quarterly sublease rental rates are based on a small and changing number of observations that tend to bias the volatility calculation upward.[113] The greater Los Angeles calculation overcomes the shortcomings associated with the limited number of downtown observations, but includes observations from a wider geographic region. Both volatility estimates are significantly lower than Prof. Grenadier's estimate of 35 percent.

71. As a reasonableness check, I also calculated comparable volatility figures based on the average rental rates faced by master tenants (as opposed to sub-tenants in the space Wells Fargo offered in the Garland building). The volatility of direct lease rates for class A office buildings

[106] Interview with Jay Spivey, Sr. Director of Research and Analytics, CoStar Group, April 4, 2009.
[107] Email from Nan Eckman to Walter Torous. "FW: Re: lease rates (#8642-132604407-5787)." May 4, 2009.
[108] Email from Nan Eckman to Walter Torous. "FW: Re: lease rates (#8642-132604407-5787)." May 4, 2009.
[109] CoStar website: http://www.costar.com/. Accessed May 13, 2009.
[110] WFP-03754 & WFP-03755.
[111] To arrive at these estimates, I calculate the annualized sample standard deviation of consecutive changes in these lease rates from the beginning of the CoStar sample period (the second quarter of 1996) through the fourth quarter of 1998.
[112] I estimate the volatility of lease rates for Class A office buildings since CoStar classifies the Garland building as Class A. See CoStar Report: The Garland Center.
[113] The number of buildings in downtown Los Angeles for which sublease rental rates are reported by CoStar between 1996 and 1998 varies between nine and 21. Further, relatively large changes in average rental rates correspond with relatively large changes in the mix of properties surveyed in given quarters. See Appendix A for detail.

in downtown Los Angeles as of the beginning of 1999 was approximately 15.8 percent.[114] The corresponding figure for the greater Los Angeles region was 3.5 percent.[115]

72. The effect on the estimated values of the purchase and extension options of using class A sublet rate volatility, as compared to building value volatility, is shown in Table 6. Based on a lease rate volatility of 13.6 percent, the estimated value of the purchase option is $342,921 and the estimated value of the extension option is $386,233. Based on a lease rate volatility of 8.3 percent the estimated value of the purchase option is $2,460 and the estimated value of the extension option is $2,844. Both sets of figures are substantially lower than the estimates made by Prof. Grenadier.[116]

73. Thus, incorporating the appropriate volatility measure results in estimates that suggest the Garland extension and purchase options had, as of 1998, limited value. This finding is consistent with the observation by Ms. Barbara Reeve-Bailey, a Vice President in Wells Fargo's Corporate Properties Group.[117] She said that in 1999, "[t]here was no profitable reason … to think we would have extended the lease in 2009."[118]

Table 6: Effect of Revision to Volatility Value on Purchase and Extension Option Values

Description	Volatility (Percent)	Purchase Option Value	Extension Option Value
Professor Grenadier's reported values	35.0	$ 17,054,121	$ 19,678,290
Corrected inputs (S0, E1, E2, and E3)	35.0	14,722,475	17,413,848
Corrected building value volatility	24.4	5,475,880	6,176,737
Based on downtown Los Angeles lease rate volatility	13.6	$ 342,921	$ 386,233
Based on greater Los Angeles lease rate volatility	8.3	$ 2,460	$ 2,844

[114] See Appendix B.
[115] See Appendix B.
[116] In addition, I calculate the value of the purchase and extension options using Prof. Grenadier's original values for S0, E1, E2, and E3, while assuming volatilities of 8.3 and 13.6 percent. For these inputs, the values of the purchase options are $8,677 and 583,326, and those of the extension options are $9,510 and 676,764, respectively. Finally, I calculate the values of the purchase and extension options using my revised values for S0, E1, E2, and E3, and the direct lease rate volatilities of 3.5 and 15.8 percent. For my inputs, at 3.5 percent volatility, both the purchase and extension option have zero value. Using a 15.8 percent volatility, the values of the purchase and extension options are $866,105 and $999,924, respectively.
[117] Deposition of Barbara Reeve-Bailey, p. 7.
[118] Deposition of Barbara Reeve-Bailey, p. 76.

5. Timing of Transfer

74. Wells Fargo was entitled and obligated to remain in the building through the end of the lease in 2008. The Master Lease required a one year notice to exercise the extension [and purchase] option[s]. Thus, the choice of transferring the Garland lease to Charter to take advantage of regulatory flexibility may be thought of as an option. Wells Fargo need not have exercised this option in 1998 to take advantage of any associated regulatory flexibility. Waiting longer would have allowed Wells Fargo to make a more informed choice before incurring the costs associated with transferring the Garland lease to Charter. Specifically, waiting would have provided Wells Fargo with a better understanding of what lease rates were likely to be in 2009 and whether or not the regulatory benefits of transferring the leases would still be in place. By transferring the Garland lease to Charter in 1998, Wells Fargo risked unnecessarily incurring any associated transfer costs. This risk could have been minimized by waiting until 2007 to transfer the Garland lease.

Walter Torous. July 31, 2009

Walter Torous Date

Exhibit 1: Curriculum Vitae

WALTER N. TOROUS

John E. Anderson Graduate School of Management
UCLA

Office Address:

Anderson School of Management
110 Westwood Plaza
Box #951481
University of California, Los Angeles
Los Angeles, California, 90095-1481
Telephone: (Office) (310) 825-4059
(Secretary) (310) 825-2508
(FAX) (310) 206-5455

E-Mail walter.n.torous@anderson.ucla.edu

Home Address

328 Loring Avenue
Los Angeles, California, 90024
Telephone: (310) 234-1090

Academic Degrees

B. Math. University of Waterloo, Statistics and Economics, 1976
Ph. D. University of Pennsylvania, Economics, 1981

Academic Appointments

1980-81 Graduate School of Business Administration, University of Michigan, Lecturer

1981-85 Graduate School of Business Administration, University of Michigan, Assistant Professor

1986-87 Graduate School of Management, University of California, Los Angeles, Visiting Assistant Professor

1987-90 Graduate School of Management, University of California, Los Angeles, Assistant Professor

1990-95 John E. Anderson Graduate School of Management, University of California, Los Angeles, Associate Professor

1995-97 London Business School, Corporation of London Professor of Finance

1995-2006 John E. Anderson Graduate School of Management, University of California, Los Angeles, Professor

1997-2003 Director, Richard S. Ziman Real Estate Center, John E. Anderson Graduate School of Management, University of California, Los Angeles

2006- John E. Anderson Graduate School of Management, University of California, Los Angeles, Lee and Seymour Graff Endowed Professor

Professional Activities

Journal of Housing Economics, Associate Editor, 1991 -
Journal of Real Economics and Finance, Associate Editor, 1992 -
Journal of the American Real Estate and Urban Economics Association,
Associate Editor, 1993 - 2005
Editor, 2006 -
Pacific-Basin Finance Journal, Associate Editor, 1997- 2003
Economic Notes, Associate Editor, 1999 -

Ad hoc referee for Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Banking and Finance, Journal of Business, Review of Financial Studies, Journal of Financial Economics, Journal of Money, Credit, and Banking, Management Science, Journal of Empirical Finance, Journal of International Money and Finance

Member:
American Finance Association, 1980 -
American Real Estate and Urban Economics Association, 1990 -
Western Finance Association, 1980 -
Associate Program Chair, 1990
Board of Directors, 1991-94

Refereed Publications

1. Ball, C. A., and Torous, W. N., "A Simplified Jump Process for Common Stock Returns," Journal of Financial and Quantitative Analysis, 18:1, pp. 53-65, March 1983.

2. Ball, C. A., and Torous, W. N., "Bond Price Dynamics and Options," Journal of Financial and Quantitative Analysis, 18:4, pp. 517-531, December 1983.

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4. Milne, W. J., and Torous, W. N., "Long-Term Interest Rates and the Price Level: The Canadian Evidence on the Gibson Paradox," Canadian Journal of Economics, 17:2, pp. 327-339, May 1984.

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16. Haugen, R. A., Talmor, E., and Torous, W. N., "The Effect of Volatility Changes on the Level of Stock Prices and Subsequent Expected Returns," Journal of Finance, 46:8, pp. 985-1007, July 1991.

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    Awarded Edwin S. Mills Prize for best paper in Real Estate Economics for 2007.

34. Plazzi, A., Torous, W. N., and Valkanov, R., "The Cross-Sectional Dispersion of Commercial Real Estate Returns and Rent Growth: Time Variation and Economic Fluctuations", Real Estate Economics, 36:3, pp. 403-429, 2008.

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34. Geske, R. L., and Torous, W. N., "Black-Scholes Option Pricing and Robust Variance Estimation," pp. 49-69, in Options: Recent Advances in Theory and Practice, S. Hodges (Editor), Manchester University Press, 1990.

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45. Goyal, A., Kahl, M., and Torous, W. N., “The Long-Run Performance of Financially Distressed Firms: An Empirical Investigation”, 2003.

46. Goto, S., and Torous, W. N., “The Conquest of U.S. Inflation: Its Implications for the Fisher Hypothesis and the Term Structure of Nominal Interest Rates”, 2003.

47. Linnainmma, J., Goto, S., and Torous, W. N., “Is Seeing Believing?: Over- and Underreaction as Fully Rational Responses to Large Signals”, 2007.

Exhibit 2: Information Considered

Description

01 Bates Stamped Documents

KPMG-BOX02-1619 - KPMG-BOX02-1626

KPMG-BOX04-1747 - KPMG-BOX04-1784

WFC-36-0115 - WFC-36-0126

WFC-36-0971 - WFC-36-0978

WFC-BP-006-0894 - WFC-BP-006-1093

WFC-BP-008-0441 - WFC-BP-008-0448

WFC-LA-002-0015 - WFC-LA-002-0540

WFC-LA-002-1056 - WFC-LA-002-1380

WFC-LA-007-0264 - WFC-LA-007-0293

WFC-LA-025-0484 - WFC-LA-025-0894

WFC-SF-012-1251 - WFC-SF-012-1302

WFP-02232 - WFP-02345

WFP-03744 - WFP-04037

WFP2-06544 - WFP2-06546

WFPEM013646A - WFPEMO013647

02 Depositions and Declarations

Deposition of Barbara Reeve-Bailey, November 12, 2008

Deposition of Steven R. Grenadier, Ph.D., March 17, 2009

03 Expert Reports

Report of Steven R. Grenadier, Ph.D., December 1, 2008

Revised Report of Steven R. Grenadier, Ph.D., February 4, 2009

Revised Report of Steven R. Grenadier, Ph.D., March 16, 2009, and backup

04 Electronic Data

CoStar Data: CoStar Downtown LA Class A.pdf, CoStar Greater LA Class A.pdf, History 072109 1.xls

CoStar Data: Garland Vacancy Rates, new_garland.pdf, la_data.xls, garland_history_costar.xls, la_nyc_dallas_&_atlanta_costar_data.xls

05 Articles

Description

05 Articles

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07 Company & Industry Reports

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10 Work Product

CoStar Downtown LA Class A.xls

CoStar Greater LA Class A.xls

CoStar Rent Volatility - Downtown LA.xls

CoStar Rent Volatility.xls

Direct lease and sublease building count Stata code

Distress discount calculation.xls

Downing Figure Volatilities (Table 3).xls

Google option graphs (Figs 2 & 3).xls

Google Volatility Calculations.xls

Merton.xls

Option Payoff Graph (Fig. 1).xls

Prof. Grenadier Real Estate Input Replication (Table 1).xls

Purchase and extension options Matlab code

Purchase and Extention Option Values (Tables 2, 4, 5).xls

Purchase option volatility sensitivity (Figs. 4 & 5).xls

Appendix A

Average Los Angeles Class A Sublease Rates

Quarter	Downtown Los Angeles				Greater Los Angeles			
	Average Rent	Number of Buildings	Number of Buildings Added	Number of Buildings Dropped	Average Rent	Number of Buildings	Number of Buildings Added	Number of Buildings Dropped
2009 2Q	$ 24.52	39	1	-	$ 28.20	503	17	2
2009 1Q	24.08	38	1	-	28.46	488	44	1
2008 4Q	23.49	37	1	1	29.56	445	24	13
2008 3Q	23.62	37	2	1	29.84	434	35	3
2008 2Q	23.23	36	2	1	30.26	402	29	20
2008 1Q	22.67	35	-	1	30.78	393	49	23
2007 4Q	21.52	36	5	2	29.92	367	42	27
2007 3Q	21.14	33	2	1	27.65	352	41	22
2007 2Q	21.42	32	1	1	27.34	333	33	30
2007 1Q	21.12	32	1	1	26.14	330	29	29
2006 4Q	21.08	32	2	-	25.51	330	20	15
2006 3Q	21.44	30	1	6	24.80	325	26	26
2006 2Q	20.80	35	3	1	23.98	325	36	17
2006 1Q	20.25	33	-	1	24.27	306	35	19
2005 4Q	18.54	34	4	-	23.47	290	30	-
2005 3Q	21.09	30	2	-	23.89	260	27	-
2005 2Q	18.16	28	3	-	23.07	233	47	-
2005 1Q	17.98	25	4	-	20.26	186	34	38
2004 4Q	18.03	21	2	7	21.43	190	24	39
2004 3Q	17.46	26	3	1	20.51	205	33	45
2004 2Q	17.01	24	1	3	20.30	217	30	38
2004 1Q	16.27	26	6	3	20.42	225	54	37
2003 4Q	16.73	23	2	3	21.40	208	22	49
2003 3Q	17.10	24	2	2	21.06	235	42	33
2003 2Q	17.47	24	24	-	20.41	226	225	2
2003 1Q		-	-	25	22.31	3	-	208
2002 4Q	18.94	25	1	4	21.42	211	29	62
2002 3Q	19.53	28	5	1	22.20	244	44	39
2002 2Q	20.37	24	2	-	22.59	239	36	29
2002 1Q	21.17	22	2	3	24.04	232	34	31
2001 4Q	21.14	23	-	2	24.75	229	30	32
2001 3Q	21.20	25	6	2	24.66	231	62	33
2001 2Q	20.13	21	1	1	25.52	202	45	31
2001 1Q	20.23	21	1	7	25.57	188	79	56
2000 4Q	19.12	27	6	-	24.43	165	73	37
2000 3Q	19.13	21	-	1	22.20	129	15	17
2000 2Q	19.25	22	1	6	22.90	131	47	50
2000 1Q	17.32	27	2	1	20.53	134	23	27
1999 4Q	16.97	26	5	2	20.57	138	29	38
1999 3Q	16.53	23	6	5	20.61	147	46	48
1999 2Q	18.12	22	11	2	20.85	149	81	35
1999 1Q	13.36	13	4	-	20.93	103	44	23
1998 4Q	13.63	9	1	13	21.29	82	24	86
1998 3Q	15.14	21	6	2	20.54	144	42	31
1998 2Q	15.43	17	2	4	19.93	133	30	21
1998 1Q	15.62	19	12	2	19.43	124	77	26
1997 4Q	17.67	9	1	5	19.86	73	18	25
1997 3Q	16.61	13	2	2	19.82	80	19	32
1997 2Q	17.93	13	5	2	20.72	93	25	23
1997 1Q	19.36	10	3	2	20.77	91	19	26
1996 4Q	17.92	9	-	1	20.62	98	31	22
1996 3Q	18.42	10	3	4	19.41	89	29	25
1996 2Q	18.09	11	-	-	21.06	85	-	-
Average	$ 19.13	24.17	3.08	2.55	$ 23.25	222.17	38.85	30.96
Average (96-98)	$ 16.89	12.82	3.18	3.36	$ 20.31	99.27	28.55	28.82
Volatility	13.7%				8.8%			
Volatility (96-98)	13.6%				8.3%			

Source: CoStar. Available at: www.costar.com, accessed 7/23/2009.
Note: The building count summaries are based on CoStar pdf files that were converted to Microsoft Excel using Omnipage.

Appendix B

Average Los Angeles Class A Direct Lease Rates

Quarter	Downtown Los Angeles				Greater Los Angeles			
	Average Rent	Number of Buildings	Number of Buildings Added	Number of Buildings Dropped	Average Rent	Number of Buildings	Number of Buildings Added	Number of Buildings Dropped
2009 2Q	$ 34.75	58	2	-	$ 34.54	778	17	3
2009 1Q	35.62	56	1	-	34.81	765	21	2
2008 4Q	34.93	55	3	-	35.38	746	27	-
2008 3Q	34.84	52	-	-	35.63	719	17	-
2008 2Q	34.41	52	1	-	35.37	702	21	14
2008 1Q	34.48	51	2	4	35.64	695	29	17
2007 4Q	32.82	53	1	1	34.91	683	14	20
2007 3Q	32.80	53	1	-	34.56	689	23	15
2007 2Q	32.43	52	1	1	32.85	681	21	17
2007 1Q	29.84	52	-	1	31.39	677	24	20
2006 4Q	30.41	53	-	1	30.41	673	20	19
2006 3Q	30.36	54	-	1	29.72	672	18	17
2006 2Q	29.54	55	-	1	28.73	671	13	15
2006 1Q	29.14	56	1	1	28.57	673	13	7
2005 4Q	28.01	56	-	-	27.78	667	13	-
2005 3Q	26.24	56	2	-	27.69	654	17	-
2005 2Q	26.22	54	2	-	27.09	637	32	-
2005 1Q	26.36	52	3	1	26.81	605	30	39
2004 4Q	25.60	50	1	-	26.59	614	26	28
2004 3Q	25.52	49	-	1	26.64	616	23	27
2004 2Q	25.37	50	-	4	26.66	620	23	28
2004 1Q	25.37	54	-	-	26.76	625	25	34
2003 4Q	25.01	54	-	-	26.65	634	17	18
2003 3Q	24.90	54	1	-	26.61	635	22	23
2003 2Q	24.75	53	-	3	26.42	636	10	71
2003 1Q	24.66	56	-	2	26.35	697	16	19
2002 4Q	24.45	58	-	-	26.63	700	16	8
2002 3Q	24.20	58	5	-	26.84	692	18	12
2002 2Q	24.70	53	1	-	27.51	686	20	13
2002 1Q	24.74	52	2	2	27.78	679	18	14
2001 4Q	24.51	52	1	2	28.24	675	25	13
2001 3Q	24.57	53	3	1	28.07	663	24	22
2001 2Q	24.29	51	-	-	28.36	661	21	31
2001 1Q	24.26	51	1	3	27.82	671	25	19
2000 4Q	23.81	53	1	-	26.73	665	25	27
2000 3Q	22.81	52	-	-	25.78	667	11	22
2000 2Q	22.45	52	-	5	25.52	678	24	24
2000 1Q	21.33	57	-	-	25.06	678	16	10
1999 4Q	21.26	57	3	-	24.75	672	15	8
1999 3Q	21.52	54	2	1	24.37	665	44	11
1999 2Q	21.94	53	3	1	24.07	632	48	34
1999 1Q	21.34	51	1	2	23.32	618	23	19
1998 4Q	20.65	52	2	1	23.23	614	9	28
1998 3Q	22.10	51	1	2	22.64	633	16	14
1998 2Q	19.61	52	-	1	22.08	631	9	14
1998 1Q	19.52	53	9	1	21.73	636	108	18
1997 4Q	19.61	45	2	4	21.74	546	12	33
1997 3Q	19.73	47	-	2	21.84	567	16	24
1997 2Q	22.42	49	1	-	21.59	575	30	27
1997 1Q	19.53	48	1	3	21.20	572	29	27
1996 4Q	20.04	50	3	-	21.72	570	43	3
1996 3Q	19.40	47	5	1	21.38	530	59	9
1996 2Q	19.74	43	-	-	20.63	480	-	-
Average	$ 25.64	52.53	1.30	1.02	$ 27.27	651.32	23.32	17.68
Average (96-98)	$ 20.21	48.82	2.18	1.36	$ 21.80	577.64	30.09	17.91
Volatility	7.8%				3.5%			
Volatility (96-98)	15.8%				3.5%			

Source: CoStar. Available at: www.costar.com, accessed 7/23/2009.
Note: The building count summaries are based on CoStar pdf files that were converted to Microsoft Excel using Omnipage.